
M012: ROPED CLIMBING

TSP Number/Title	M012: Roped Climbing
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Effective Date	Implement next class iteration upon receipt
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Supersedes TSP(s)/Lessons	None
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TSP User	The following courses use this TSP: Summer Instructor Qualification Course Basic Military Mountaineering Course Assault Climbers' Course
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Proponent	United States Army Alaska, Northern Warfare Training Center
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Improvement Comments	Send comments and recommendations on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to:
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ATTN: TRAINING ADMINISTRATOR
COMMANDANT USARAK NWTC
1060 GAFFNEY ROAD #9900
FORT WAINWRIGHT, AK 99703-9900

Security Clearance/Access	Public Domain
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Foreign Disclosure Restrictions	The Lesson Developer in coordination with the USARAK NWTC foreign disclosure authority has reviewed this lesson. This lesson is releasable to foreign military students from all requesting foreign countries with Approval of Commandant USARAK NWTC.
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Purpose

This training support package provides the instructor with a standardized lesson plan for presenting instruction for:

Task Number	Task Title
VIII.0700	Tie into a rope

Technique of Delivery

Lesson Number	Instructional Strategy	Media
M012	Class and Practical Exercise	None

This TSP contains

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Lesson 1 VIII.0700, Tie into the climbing rope**SECTION I****ADMINISTRATIVE DATA****All courses
including this
lesson**

Course Number	Course Title
NA	Mountain Instructor Qualification Course
NA	Basic Mountaineering Course
NA	Assault Climber Course

**Task(s) Taught
or Supported**

Task Number	Task Title
VIII.0701	Tie into the end of a rope with a bowline on a coil
VIII.0702	Tie into the middle of a rope with a double bowline
VIII.0703	Construct and use an improvised seat harness
VIII.0704	Construct and use an improvised chest harness
VIII.0705	Construct and use an improvised body harness

**Task(s)
Reinforced**

Task Number	Task Title
VI.0200	Risk Management for Mountain Operations
VIII.0200	Mountaineering Equipment
VIII.0300	Rope Management and Knots

**Test Lesson
Number**

Hours	Lesson Number	Lesson Title
	M020/M022	BMC Mountaineering Review, MIQC Review

**Prerequisite
Lesson(s)**

M005, M006, M007, M008, M009, M010, M011

References

Number	Title	Date	Additional information
FM 3-97.6	Mountain Operations	NOV 00	
FM 3-97.61	Military Mountaineering	AUG 02	
NA	USARAK NWTC Mountain Operations Manual	FY 2003	
NA	Risk Management for Mountain Operations	FY 2003	

**Student Study
Assignment**

Read M012

**Instructor
Requirements**

MIQC graduate, TAITC graduate

**Additional
Support
Personnel
Requirements**

None

**Equipment
Required****Instructor Equipment:**

- 1 twenty five foot dynamic rope
- 1 twenty five foot 1 inch tubular webbing
- 1 standard runner

Student Equipment:

- 1 twenty five foot dynamic rope
 - 1 twenty five foot 1 inch tubular webbing
 - 1 standard runner
-

**Materials
Required****Instructor Materials:**

- TSP
- NWTC Mountaineering Operations Manual
- Risk Management for Mountain Operations

Student Materials:

- NWTC Mountaineering Operations Manual
 - Risk Management for Mountain Operations
-

**Classroom,
Training Area
and Range
Requirements**

Area large enough to facilitate eight students and one SGL. Location can be inside or outside, no special environment required.

**Ammunition
Requirements**

None

**Instructional
Guidance**

Before presenting this lesson, instructors must thoroughly prepare by studying this lesson and identified reference material.

**Branch Safety
Manager
Approval**

NAME	Rank	Position	Date
Mark Gilbertson	GS-09	Training Specialist	

**Proponent
Lesson Plan
Approvals**

NAME	Rank	Position	Date
Peter Smith	GS-12	Training Administrator	

M012a: ROPED CLIMBING: TYING INTO A ROPE

SECTION II**INTRODUCTION**

Method of instruction: Small Group
Type of instruction: Demonstration and Practical Exercise
Instructor to student ratio: 1:8
Time of instruction: 3 Hours
Media used: None

Motivator

When 4th and 5th class terrain cannot be avoided, ropes can provide the margin of safety required to move personnel over this terrain. In order to use a rope safely for climbing, you must first learn how to connect yourself to the rope. There are many methods for connecting to a rope, and this block of instruction will provide you with some of these methods.

Terminal Learning Objective

ACTION	Tie into the climbing rope
CONDITION	Given a dynamic rope, and adequate sling material
STANDARD	Tie into the climbing rope IAW the NWTC Mountain Operations Manual.

Safety Requirements

Ensure that students:

- Receive a risk assessment prior to movement to the training area and before practical exercises.
 - Have all necessary equipment for the PE's, to include any additional equipment required by the NWTC SOP.
 - Have two full canteens and drink adequate water to avoid becoming dehydrated. (If in a field environment)
 - Receive a briefing on the symptoms of heat injury or cold weather injury, as appropriate. (If in a field environment)
-

Risk Assessment Level

Determined by instructor

Environmental Considerations

None

Evaluation

NOTE: Inform the students where their examination will take place as posted on the training schedule and when they will receive feedback on the test. Include any retest information. Inform the students that they must turn in all recoverable reference material after the examination.

Instructional Lead-in

In order to perform roped climbing you will need to select a method to connect yourself to the rope. You have already learned about mountaineering equipment and basic rope management and knots. You will use this knowledge to tie into a climbing rope.

ELO A

ACTION	Tie into the climbing rope with a bowline on a coil
CONDITION	Given a dynamic climbing rope
STANDARD	Tie into the climbing rope with a bowline on a coil IAW the NWTC Mountain Operations Manual.

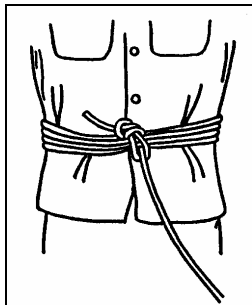
Learning Step /Activity 1- Tying Into the end of the climbing rope with a bowline on a coil

a. Traditionally, the standard method of attaching oneself to the climbing rope to the body was with a bowline on a coil around the waist. The extra wraps of this method distribute the force of a fall over a larger area of the torso than a single bowline would, and help prevent the rope from riding up over the rib cage and under the armpits. The knot must be tied snugly around the narrow part of the waist, just above the bony portions of the hips (pelvis).

b. To tie into the rope using the bowline on a coil:

1. Stack a climbing rope and find one end; grasp the rope about one meter from the end and place this length over your right shoulder. The running end is to the back of the body.
2. Starting at the bottom of the ribcage, wrap the standing part of the rope around your body and down in a clockwise manner at least four times. "Sucking in the gut" a bit when making the wraps will ensure a snug fit.
3. With the standing portion of the rope in your left hand make a clockwise loop toward the body. The standing portion is on the bottom.
4. Ensuring the loop does not come uncrossed, bring it up under the coils between the rope and your body.
5. Using the running end, pass it down through the loop, around the standing portion of the rope from right to left, and then back up through the loop.
6. Pull on the running end of the rope and the standing portion of the rope to dress and set the knot.
7. Safety the bowline with an overhand around the top, single coil.

c. The bowline on a coil is a very safe and effective method for attaching to the rope when the terrain is low angled, **WITHOUT THE POSSIBILITY OF A SEVERE FALL**. When the terrain gets steeper, a fall will generate more force on the climber and this will be felt through the coils of this type of attachment and a hard fall will cause the coils to ride up against the ribs. Even in a relatively short fall, if the climber ends up suspended in mid-air and unable to regain footing on the rock, the rope around the waist can easily cut off circulation and breathing in a relatively short time.



TYING IN WITH A BOWLINE ON A COIL

d. The checkpoints for the bowline on a coil are:

1. A minimum of four wraps, not crossed, with a bight held in place by a loop.
2. The loop must be underneath all wraps.
3. Knot is secured with an overhand around the upper most wrap; overhand has at least a three inch tail.
4. Knot is properly dressed and set.

Learning Step/ Activity - 2 Tying into the middle of the climbing rope with a bowline on a coil

a. To tie into the middle of the rope using the bowline on a coil:

1. Stack a climbing rope and find middle of the rope; form a bight, grasp the rope about one meter from the bend in the bight and place this length over your right shoulder. The running end is to the back of the body.
2. Starting at the bottom of the ribcage, wrap the standing parts of the rope around your body and down in a clockwise manner at least two times. "Sucking in the gut" a bit when making the wraps will ensure a snug fit.
3. With the standing portions of the rope in your left hand make a clockwise loop toward the body. The standing portion is on the bottom.
4. Ensuring the loop does not come uncrossed, bring it up under the coils between the rope and your body.
5. Using the running end, pass it down through the loop, around the standing portion of the rope from right to left, and then back up through the loop.
6. Pull on the running end of the rope and the standing portion of the rope to dress and set the knot.
7. Safety the bowline with an overhand on a doubled rope around the top two coils.

b. The checkpoints for the bowline on a coil are:

1. A minimum of four wraps, not crossed, with a bight held in place by a loop.
2. The loop must be underneath all wraps.
3. Knot is secured with an overhand on a double overhand around the upper most wrap; overhand has at least a three inch tail.
4. Knot is properly dressed and set.

ELO B

ACTION	Construct and use an improvised seat harness
CONDITION	Given 25 ft webbing (1" tubular nylon)
STANDARD	Construct and use an improvised seat harness IAW the NWTC Mountain Operations Manual.

Learning Step/ Activity 1- Improvised Seat Harness

a. The improvised seat harness is used when there is the possibility of a more severe fall or when a fall will leave the climber free hanging. It is constructed with a 25 foot length of one inch tubular nylon webbing. It is appropriate for all types of climbing as it distributes the force of a fall over the entire pelvic region and alleviates the danger of suffocation if the climber is hanging by the tie in connection only.

b. To tie the improvised seat harness:

1. Approximately 4 to 5ft from one end of the webbing, tie two fixed loops, approximately 6 inches apart, (overhand loops). Do not set the overhand knots.
2. Adjust the size of the each loop so they fit snugly around each thigh.
3. Slip the leg loops over the feet and up to the crotch, with the knots to the front and the short end on your non-dominant side.
4. Make 1 complete wrap around the waist with the short end, wrapping to the outside, and hold it in place on the hip; keep the webbing flat and free of twists when wrapping.
5. Make 2 to 3 wraps around the waist with the long end in the opposite direction (wrapping to the outside), binding down on the short end to hold it in place.
6. Grasping both ends, adjust the waist wraps to a snug fit.
7. Connect the ends with a water knot between the front and one side (on the front of the hip), so you will be able to see what you are doing.
8. Work out all of the slack in the waist straps to ensure all loops are snug.
9. All knots must be tied to standard.

Learning Step/Activity 2 – Tie the end of the climbing rope into the improvised seat harness

a. The attachment of the climbing rope to the harness is a CRITICAL LINK. The strength of the rope means nothing if it is attached poorly or incorrectly, and comes off the harness in a fall. The climber ties the end of the climbing rope to the seat harness with the re-threaded figure eight loop

knot.

b. To tie into the end of the rope:

1. Find the end of a climbing rope and tie a re-threaded figure eight loop around all waist straps and the six inch portion of webbing between the leg loops.
2. The loop of the re-threaded figure eight knot will not exceed twelve inches; the tail of the finished knot will not exceed 12 inches.
3. The knot must be tied to standard.

Learning Step/Activity 3 - Tie the middle of the climbing rope into the improvised seat harness

a. The climber ties the middle of the climbing rope to the seat harness with a double bowline knot.

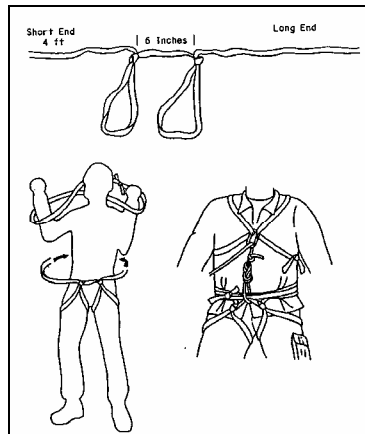
1. Find the end of a climbing rope and tie a re-threaded figure eight loop around all waist straps and the six inch portion of webbing between the leg loops.
2. The two loops of the double bowline knot will not exceed twelve inches; the tail of the finished knot will not exceed 12 inches.
3. The knot must be tied to standard.

Learning Step/Activity 4 – Use a carabiner to connect the climbing rope to the improvised seat harness.

a. Under certain conditions many climbers prefer to attach the rope to the seat harness with a locking carabiner rather than tying the rope to it. This is a common practice for moderate snow and ice climbing, and glacier travel.

b. For the end of the rope, simply tie a figure eight loop knot. Place a locking carabiner through all waist straps and the portion of webbing between the leg loops; the gate of the carabiner should open up and away from the body. Clip the figure eight loop into the carabiner and lock the gate.

c. For the middle of the rope a figure eight loop or butterfly knot can be used to make the connection to the rope. Place a locking carabiner through all waist straps and the portion of webbing between the leg loops; the gate of the carabiner should open up and away from the body. Clip the figure eight loop or butterfly knot into the carabiner and lock the gate.



IMPROVISED SEAT AND CHEST HARNESS

ELO C	ACTION	Construct and use an improvised chest harness
	CONDITION	Given 9/16 inch or 1 inch tubular nylon webbing of six to ten feet in length
	STANDARD	Construct and use an improvised chest harness IAW the NWTC Mountain Operations Manual.

Learning Step/ Activity 1- Improvised Chest Harness

a. The chest harness will provide an additional connection point for the rope. The incorporation of a chest harness will assist with remaining upright should the climber take a fall into a crevasse or during rappelling or ascending a fixed rope, especially while wearing a heavy pack. This additional connection will provide a comfortable hanging position on the rope, but otherwise provides no additional protection from injury during a fall, (if the seat harness is fitted correctly). If rappelling or ascending long or multiple pitches, let the pack hang on a drop cord below the feet and attached to the harness tie in point. There are pre-sewn chest harnesses available commercially that will invariably offer comfort or performance features over an improvised chest harness, such as padding, gear loops, or ease of adjustment.

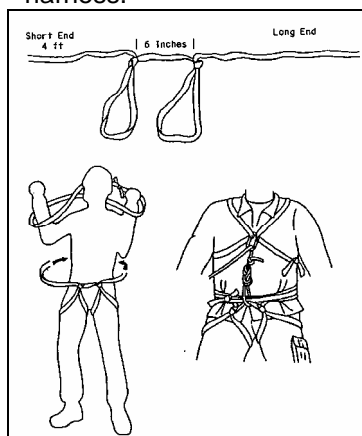
b. To tie an improvise chest harness:

1. Tie the ends of the webbing together with a water knot, making a sling 3 to 4 ft. long.
2. Put a single twist into the sling, forming two loops.
3. Place an arm through each loop formed by the twist, just as you would put on a jacket, and drape the sling over the shoulders.
4. The twist, or cross in the sling should be in the middle of the back.
5. Join the two loops at the chest with a carabiner.
6. The water knot should be set off to either side for easy inspection, (if a pack is to be worn, the knot will be uncomfortable if it gets between the body and the pack).
7. The chest harness should fit just loose enough to allow necessary clothing and not to restrict breathing or circulation.
8. Adjust the size of the sling if necessary.

Learning Step/Activity 2 – Utilize the improvised chest harness

a. The rope should be tied into the improvised seat harness using one of the methods described above. The rope is then clipped into the carabiner on the chest harness.

b. The chest harness should never be used alone; it must always be use din conjunction with a seat harness.



IMPROVISED SEAT AND CHEST HARNESS

ELO D

ACTION	Construct an improvised body harness
CONDITION	Given 25 ft webbing (1" tubular nylon) and 9/16 inch or 1 inch tubular nylon webbing of six to ten feet in length
STANDARD	Construct an improvised body harness IAW the NWTC Mountain Operations Manual.

Learning Step/ Activity 1- Improvised Body Harness

Full body harnesses incorporate a chest and seat harness into one assembly. This is the safest harness in use as it relocates the tie-in point higher, at the chest, reducing the chance of an inverted position when hanging on the rope. This is especially helpful when moving on ropes with heavy packs. A full body harness only affects your body position when hanging on the rope and will not prevent head injury in a fall.

a. To tie the improvised body harness:

1. While wearing the improvised seat and chest harness (without carabiner), girth hitch a standard runner to the connecting point of the seat harness.
2. Route the other end of the runner through the connecting points of the chest harness.
3. The "chest harness to seat harness distance" should be approximately 12 inches when completed. If this distance is longer, the chest harness will take the majority of your weight instead of the seat harness.
4. Tie the runner on itself with a waterknot.
5. The resulting loop in the runner is the connection point.

SECTION IV**SUMMARY**

**Review/
Summarize
Lesson**

ACTION	Tie into the climbing rope
CONDITION	Given a dynamic rope, and adequate sling material
STANDARD	Tie into the climbing rope IAW the NWTC Mountain Operations Manual.

**Check on
Learning**

- a. What does a chest harness offer the climber that a seat harness cannot?
A chest harness will reduce the chance of an inverted hanging position.
- b. What knot do you tie in with when using an improvised seat harness and the end of the rope?
The rethreaded figure eight knot.
- c. What knot is used to tie into the middle of the rope?
The double bowline.

**Transition to
Next Lesson**

As per NWTC training schedule; dependent upon course in conduct.

SECTION V**STUDENT EVALUATION**

**Testing
Requirements**

Students will be tested on this task during the Mountain Stakes portion of training as per the NWTC training schedule for this course.

**Feedback
Requirement**

Students will receive two opportunities to pass each event tested. Re-training will be conducted for students that fail the first iteration of testing. Refer to M020 for specifics.

Lesson 2, VIII.0701, Top Roped Climbing

SECTION I

ADMINISTRATIVE DATA

Task(s) Taught or Supported

Task Number	Task Title
VIII.0701.01	Establish a top roped climb
VIII.0701.02	Perform a top roped climb

Tasks(s)

Reinforced

Task Number	Task Title
VI.0200	Risk Management for Mountain Operations
VIII.0200	Mountaineering Equipment
VIII.0300	Rope Management and Knots
VIII.0400	Anchors
VIII.0500	Climbing
VIII.0600	Belays

Test Lesson Number

Hours	Lesson Number	Lesson Title
	M020/M022	BMC Mountaineering Review, MIQC Review

Prerequisite Lessons

M005, M006, M007, M008, M009, M010, M011

References

Number	Title	Date	Additional information
FM 3-97.6	Mountain Operations	NOV 00	
FM 3-97.61	Military Mountaineering	AUG 02	
NA	USARAK NWTC Mountain Operations Manual	FY 2003	
NA	Risk Management for Mountain Operations	FY 2003	

Student Study Assignments

Read TSP M012

Instructor Requirements

MIQC graduate, TAITC graduate

Additional Support Personnel Requirements

None

Equipment Required

Instructor Equipment:

- 1 dynamic climbing rope
- 3 twenty five feet 1 inch tubular webbing
- 1 Locking carabiner

- 3 Non-locking oval or D shape carabiners

Student Equipment:

- 1 dynamic climbing rope
- 3 twenty five feet 1 inch tubular webbing
- 1 Locking carabiner
- 3 Non-locking oval or D shape carabiners

**Materials
Required**

Instructor Materials:

- NWTC Mountain Operations Manual
- Risk Management for Mountain Operations

Student Materials:

- NWTC Mountain Operations Manual
- Risk Management Guide for Mountain Operations

**Classroom
Training
Area and
Range
Requirements**

Rock climbing area with safe access to the top of the climb(s). Climb(s) should be at least thirty feet tall and with sufficient natural anchors at the top and anchors at the bottom.
Area large enough to facilitate eight students, one instructor, and two assistant instructors.
Rock can be real or simulated.

**Ammunition
Requirements**

None

**Instructional
Guidance**

Before presenting this lesson, instructors must thoroughly prepare by studying this lesson and identified reference material.

**Branch
Safety
Manager
Approval**

NAME	Rank	Position	Date
Mark Gilbertson	GS-09	Training Specialist	

**Proponent
Lesson Plan
Approvals**

NAME	Rank	Position	Date
Peter Smith	GS-12	Training Administrator	

M012b: ROPED CLIMBING: TOP ROPED CLIMBING

SECTION II**INTRODUCTION**

Method of instruction: Small Group
Type of instruction: Demonstration and Practical Exercise
Instructor to student ratio: 1:8
Time of instruction: 3 Hours
Media used: None

Motivator

Movement in mountainous terrain will sometimes require more than just merely walking and occasional negotiation of short steep slopes. You may need to climb a tall section of rock at times when it's not avoidable. But how do you gain confidence in your climbing abilities before you are on an actual movement in the mountains? Top roped climbing.

Top roped climbing is used for training purposes only. This method of climbing is not used for movement due to the necessity of pre-placing anchors at the top of a climb. If you can easily access the top of a climb, you can easily avoid the climb itself. For training, top roped climbing is valuable as this method allows climbers to attempt climbs above their skill level and/or to hone present skills without the risk of a fall. Top roped climbing may be used to increase the stamina of a climber training for longer routes.

The belayer is positioned at the base of a climb with the rope running through a top anchor and back to the climber. The belayer takes in rope as the climber moves up the rock, giving the climber the same protection as a belay from above.

Terminal Learning Objective

ACTION	Establish and perform a top roped climb
CONDITION	Given a dynamic or static rope, sling material, and adequate carabiners
STANDARD	Establish and perform a top roped climb IAW the NWTC Mountain Operations Manual.

Safety Requirements

Ensure that students:

- Receive a risk assessment prior to movement to the training area and before practical exercises.
 - Have all necessary equipment for the PE's, to include any additional equipment required by the NWTC SOP.
 - Have two full canteens and drink adequate water to avoid becoming dehydrated.
 - Receive a briefing on the symptoms of heat injury or cold weather injury, as appropriate.
-

Risk Assessment Level

Determined by instructor

Environmental Consideration

None

Evaluation

You will be evaluated on this task during the Mountain Stakes portion of training as per the NWTC training schedule for this course.

Instructional Lead-in

So far, you have learned how to establish natural anchors, how to climb, how to belay, and how to connect to a rope. Now we will combine all those new skills and establish a top roped climb and climb it.

SECTION III**PRESENTATION****ELO A**

ACTION	Establish a top roped climb
CONDITION	Given adequate mountaineering equipment and suitable terrain
STANDARD	Establish a top roped climb IAW the NWTC Mountain Operations Manual.

Learning Step/Activity 1- Establish a top rope climb

Top roped climbing is used for training purposes only. This method of climbing is not used for movement due to the necessity of pre-placing anchors at the top of a climb. If you can easily access the top of a climb, you can easily avoid the climb itself. For training, top roped climbing is valuable as this method allows climbers to attempt climbs above their skill level and/or to hone present skills without the risk of a fall. Top roped climbing may be used to increase the stamina of a climber training to climb longer routes as well as for a climber practicing protection placements.

- a. Locate a desirable route to climb. Ensure there are adequate natural anchor possibilities at the top, and ensure you can safely move to the anchor area.
- b. Assemble anchor system consisting of a primary anchor and an independent backup.
- c. Connect locking carabiner to the anchor system.
- d. If you get within a body length of the edge, connect yourself to the anchor system or another anchor to provide a safety tether.
- e. Ensure the length of the anchor system is such that the carabiner(s) are over the edge of the anchor platform.
- f. Pad the edge as necessary to prevent cutting or excessive wear on the anchor material.
- g. Connect middle of the rope to anchor at the locking carabiner and throw rope.
- h. Test the installation by having three people pull hard on the rope from below, while one person monitors the anchor for signs of failure. The gate of the locking carabiner should not come in contact with the rock as the system is weighted. The rope should not run over the rock at any point as this will abrade the rope as the system is used. The independent backup anchor should NOT bear any weight as the rope is load tested.
- i. The top rope system is ready if the anchor does not fail.

ELO B

ACTION	Execute a top roped climb
CONDITION	Given adequate mountaineering equipment and suitable terrain, and a tope rope installation in place.
STANDARD	Execute a top roped climb IAW the NWTC Mountain Operations Manual.

Learning Step/ Activity 1- Execute a top rope climb

- a. Once the top rope system is established, the climber and the belayer get ready to execute the climb:
 1. With a top rope installation in place and tested, a climber and a belayer will need to take their positions. The belayer should be anchored so that he is not pulled out of position should the climber fall. This anchor will also assist the belayer in lowering the climber when the climb is complete.
 2. Climber correctly connects to the rope.

-
3. Climber and belayer are both wearing helmets. Watches, rings and jewelry are removed.
 4. Belayer correctly anchors at the base of the climb, and places the rope in a mechanical belay system (hip/body belay is not appropriate for top rope climbing). Belayer says "*BELAY ON*".
 5. The climber gives a courtesy "*CLIMBING*" when he is ready to begin climbing. The belayer responds with "*CLIMB*". The climber conducts the climb using the principles learned in the climbing class. The climber ascends no higher than the locking carabiner. The climber should check that the anchor system is solid and ensures that the gate to the locking carabiner is still locked.
 6. When the climber is ready to be lowered, he says "*TENSION*". If not at the top of the climb, he will need to inform the belayer that he is ready to come down.
 7. The belayer will remove the slack in the system by taking as much rope as he can and then respond with "*READY TO LOWER*". The climber will then say "*LOWER*". The belayer will pay out slack to lower the climber, slowly and under control. The belayer should be prepared to brake to halt the climber at any moment. The climber should be in a good "*L*" shape position as he is lowered. The climber keeps the arms out to the side to protect him from slamming into the rock should he lose footing. Do not grab the rope.
 8. When the climber reaches the ground, the climber says "*OFF BELAY*". At this time, the belayer disassembles the belay and the climber disconnects from the rope. Until the climber says "*OFF BELAY*" the belayer remains attentive to the climber.
-

SECTION IV**SUMMARY**

**Review/
Summarize
Lesson**

ACTION	Establish and perform a top roped climb
CONDITION	Given a dynamic or static rope, sling material, and carabiners
STANDARD	Establish and perform a top roped climb IAW the NWTC Mountain Operations Manual.

**Check on
Learning**

- a. During a top roped climb, if the climber says "*FALLING*", how far could he fall if the belayer is performing as he should?
The climber should not fall at all, all slack should be kept out of the rope as the climber progresses. A slight falling sensation will be felt as a dynamic rope will stretch as the climber's weight comes onto the rope, but this will only be a large amount of stretch if a large amount of rope is used.
- b. What does the climber say when he reaches the top of a climb?
"Tension!!!"

**Transition to
Next Lesson**

As per NWTC training schedule; dependant upon course conducted.

SECTION V**STUDENT EVALUATION**

**Testing
Requirements**

Students will be tested on this task during the Mountain Stakes portion of training as per the NWTC training schedule for this course.

**Feedback
Requirement**

Students will receive two opportunities to pass each event tested. Re-training will be conducted for students that fail the first iteration of testing. Refer to M020 for specifics.

Lesson 3, VIII.0702, Roped Climbing- Lead Climbing

SECTION I

ADMINISTRATIVE DATA

All courses including this lesson

Course Number	Course Title
NA	Mountain Instructor Qualification Course
NA	Basic Mountaineering Course
NA	Assault Climber Course

Task(s) Taught or Supported

Task Number	Task Title
VIII.0702.01	Prepare to lead a climb
VIII.0702.02	Perform a lead climb
VIII.0702.03	Belay and second a lead climb
VIII.0702.04	Perform a three person lead climb

Tasks(s) Reinforced

Task Number	Task Title
VI.0200	Risk Management for Mountain Operations
VIII.0200	Mountaineering Equipment
VIII.0300	Rope Management and Knots
VIII.0400	Anchors
VIII.0500	Climbing
VIII.0600	Belays

Test Lesson Number

Hours	Lesson Number	Lesson Title
	M021/M022	ACC Mountaineering Review, MIQC Review

Prerequisite Lessons

M005, M006, M007, M008, M009, M010, M011

References

Number	Title	Date	Additional Information
	NWTC Cold Weather Operations Manual	FY04	Updated yearly
	NWTC Mountain Operations Manual	FY04	Updated yearly
FM 3-97.6	Mountain Operations	November 2000	http://www.adtdl.army.mil/
FM 3-97.61	Military Mountaineering	August 2002	http://www.adtdl.army.mil/

Student Assignments

Read TSP M012

Instructor Requirements

MIQC graduate, TAITC graduate

Additional Personnel Requirements

Two assistants to demonstrate lead climb.

Equipment

Instructor Equipment

Required for Instruction	<ul style="list-style-type: none"> • 8-small wired stoppers on a carabiner • 6-medium to large wired stoppers on a carabiner • 1-Set of hexentrics, each on a separate carabiner • 8-standard length runners, with two carabiners on each • 2-double length runners, with two carabiners on each • 3-extra carabiners • 1-nut tool • 1-6ft x 7mm rope • 1-12ft x 7mm rope • 1-20ft x 7mm rope • 1-10 feet x 1in tubular webbing • 1-20 feet x 1in tubular webbing • belay / rappel device • Large locking carabiner • carabiners • nut tool • 50 meter dynamic rope • Helmet 											
Materials Required	Instructor Materials <ul style="list-style-type: none"> • NWTC Mountaineering Operations Manual • Risk Management for Mountain Operations 											
Classroom Training Area and Range Requirements	Rock climbing area with 5 th class routes and safe access to the top of the climb(s). Climb(s) should be at least thirty feet tall. Area large enough to facilitate eight students, one instructor, and two assistant instructors. Rock must not be simulated.											
Ammunition Requirements	None											
Instructional Guidance	This TSP has questions throughout to check on learning or generate discussion among the group. You are expected to add any questions that you deem necessary to clarify points for the group or to expand upon any matter discussed. You must know the information contained in this TSP well enough to teach from it, not read from it.											
Branch Safety Manager Approval	<table border="1"> <thead> <tr> <th>NAME</th> <th>Rank</th> <th>Position</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>Mark Gilbertson</td> <td>GS-09</td> <td>Training Specialist</td> <td></td> </tr> </tbody> </table>				NAME	Rank	Position	Date	Mark Gilbertson	GS-09	Training Specialist	
NAME	Rank	Position	Date									
Mark Gilbertson	GS-09	Training Specialist										
Proponent Lesson Plan Approvals	<table border="1"> <thead> <tr> <th>NAME</th> <th>Rank</th> <th>Position</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>Peter Smith</td> <td>GS-12</td> <td>Training Administrator</td> <td></td> </tr> </tbody> </table>				NAME	Rank	Position	Date	Peter Smith	GS-12	Training Administrator	
NAME	Rank	Position	Date									
Peter Smith	GS-12	Training Administrator										

M012c: ROPED CLIMBING: LEAD CLIMBING

SECTION II

INTRODUCTION

Method of instruction: Small Group
Type of instruction: Demonstration and Practical Exercise
Instructor to student ratio: 1:3
Time of instruction: 6 Hours
Media used: None

Motivator

Lead climbs have not been performed for large scale military operations since World War II. During WW II, members of the 10th Mountain Division prepared to take Riva Ridge, an area occupied by the Germans overlooking the Po Valley. This area had been fought over by the Axis and Allies before, but the Germans had the high ground and were able to use the terrain to repel attacks. As part of the preparation for this battle, the 10th Mountain Division sent experienced climbers to scout unlikely avenues of approach to move company and smaller elements onto the ridgeline in an attack on the German positions. Steep gullies and rocky cliffsides were scouted and members of the tenth fixed lines in these gullies in the days prior to the attacks to move men and equipment up for the attack. This action required the scout teams to lead up exposed terrain to fix the ropes for follow on troops. The lines were fixed and due to the unlikely nature of this approach, most of the men of the 85th Regiment were able to make it onto the high ground and defeat the German forces. If movement in mountainous terrain requires a climb of an unavoidable tall section of rock, you will need to "lead climb" up that section. In military mountaineering, the primary mission of a roped climbing team is to "fix" a route with some type of rope installation to assist movement of lesser trained personnel in the unit. This duty falls upon the most experienced climbers in the unit, usually working in 2 or 3 man groups or teams, called assault climbing teams. Of course, even if the climbing is for another purpose, roped climbing should be performed whenever the terrain becomes difficult and exposed. Lead climbs are performed primarily on 5th class terrain.

Terminal Learning Objective

ACTION	Prepare for and perform a lead climb (as a leader and follower)
CONDITION	Given a adequate mountaineering equipment and a 5 th class rock climb (YDS)
STANDARD	Prepare for and perform a two person lead climb IAW the NWTC Mountain Operations Manual.

Safety Requirement

Ensure that students:

- Receive a risk assessment prior to movement to the training area and before practical exercises.
 - Have all necessary equipment for the PE's, to include any additional equipment required by the NWTC SOP.
 - Have two full canteens and drink adequate water to avoid becoming dehydrated.
 - Receive a briefing on the symptoms of heat injury or cold weather injury, as appropriate.
-

Risk Assessment Level

Determined by the instructor

Environmental Considerations

None

Evaluation

You will be evaluated on this task during the Mountain Stakes portion of training as per the NWTC training schedule for this course.

**Instructional
Lead-in**

You have learned mountaineering equipment, rope management and knots, anchors, belay techniques, climbing, and top roped climbing. Now we will learn how to get to the tope of a route by climbing safely straight up the face instead of walking around it.

ELO A

ACTION	Prepare to lead/follow a roped climb
CONDITION	Given a adequate mountaineering equipment and a 5 th class rock climb (YDS)
STANDARD	Prepare to lead a roped climb IAW the NWTC Mountain Operations Manual.

Learning Step/ Activity 1- Lead Climbing

a. In military mountaineering, the primary mission of a roped climbing team is to "fix" a route with some type of rope installation to assist movement of lesser trained personnel in the unit. This duty falls upon the most experienced climbers in the unit, usually working in 2 or 3 man groups or teams, called assault climbing teams. Of course, even if the climbing is for another purpose, roped climbing should be performed whenever the terrain becomes difficult and exposed.

b. A lead climb consists of a belayer, a leader or climber, rope(s), webbing and hardware that is used to establish anchors or protect the climb. Protecting a climb is accomplished by the leader emplacing "intermediate" anchors as he climbs the route, into which the climbing rope is connected with a carabiner. These "intermediate" anchors protect the climber against a long, hard fall; thus the term "protecting the climb". These intermediate anchors are commonly referred to as "protection", "pro", "pieces", "pieces of pro", "pro placements", etc. For standardization within this publication, these specific anchors will hereafter be referred to as "protection"; anchors established for other purposes, such as rappel points, belays, or other rope installations will be referred to as "anchors".

c. Lead climbing with two climbers is the preferred combination for movement on technically difficult terrain. Two climbers are at least twice as fast as three climbers, and are very efficient for installing a "fixed rope", probably the most widely used rope installation in the mountains. A group of three climbers are typically used on moderate snow, ice, and snow covered glaciers where the rope team can often move at the same time, stopping occasionally to set up belays on particularly difficult sections. A group or team of three climbers is sometimes used in rock climbing because of an odd number of personnel, a shortage of ropes (such as six climbers and only two ropes), or to protect and assist an individual who has little or no experience in climbing and belaying. Whichever technique is chosen, a standard roped climbing procedure is used for maximum speed and safety.

d. The procedures for preparing for a lead climb are relatively simple.

1. The most experienced individual is the "lead" climber or leader, and is responsible for selecting the route. The leader must ensure the route is well within his ability and the ability of the second. Both leader and belayer must ensure each have the necessary equipment to complete the climb. The leader is responsible for placing protection frequently enough and in such a manner that, in the event that either the leader or the second should fall, the fall will be neither long enough nor hard enough to result in injury. The leader must also ensure that the rope is routed in a way that will allow it to run freely through the protection placements, thus minimizing friction, or "rope drag". This is accomplished with the standard and double runners.

2. When the leader selects a particular route, he must also determine how much, and what types, of equipment might be required to safely negotiate the route. The selected equipment must be carried by the leader. The leader must carry enough equipment to safely protect the route, additional anchors for the next belay, and any other items to be carried such as rucksacks or individual weapons.

3. The leader will assemble or "rack" the necessary equipment onto his harness or onto slings around the head and shoulder. Although there is no rule on how to rack, the basic leader "rack" could consist of the items listed below:

- a. 6 to 8 small wired stoppers on a carabiner
- b. 4 to 6 medium to large wired stoppers on a carabiner
- c. assorted hexentrics, each on a separate carabiner
- d. SLCDs of the required size, each on a separate carabiner
- e. 5 to 10 standard length runners, with two carabiners on each
- f. 2 to 3 double length runners, with two carabiners on each
- g. a few extra carabiners
- h. 1 nut tool

4. If you are using an over the shoulder gear sling, place the items in order from smallest to the front and largest to the rear.

5. The belayer and the leader both should carry many duplicate items while climbing.

- a. rope for short prusik sling
- b. rope for long prusik sling
- c. rope for cordellette
- d. 1- 10ft x 1" webbing
- e. 1- 20ft x 1" webbing
- f. belay device (or a combination belay rappel device)
- g. rappel device (or a combination belay rappel device)
- h. large locking carabiner
- i. a few extra carabiners
- j. nut tool

These items should be attached to each person's harnesses or gear sling so the equipment can be easily accessed while climbing.

6. One person will have a climbing rope.

7. Each person involved in the climb will be wearing a helmet and a harness.

8. Each person on the team should be ready to either climb or establish the belay and anchor as assigned.

ELO B

ACTION	Perform a lead climb
CONDITION	Given a adequate mountaineering equipment and a 5 th class rock climb (YDS)
STANDARD	Perform a lead climb IAW the NWTC Mountain Operations Manual.

Learning Step/ Activity 1- Perform a Lead Climb

a. After a belay has been established (see M011), the sequence generally follows this procedure:

1. The leader begins moving up the route and places protection within a body's length of the established belay. This prevents a fall that could rip the belayer's protection out (known as a Factor 2 fall a thorough description of fall factors is beyond the scope of this text). A second consideration is a zipper stopper. The climber's first protection should be a multidirectional anchor. The intent of this protection will be described later.

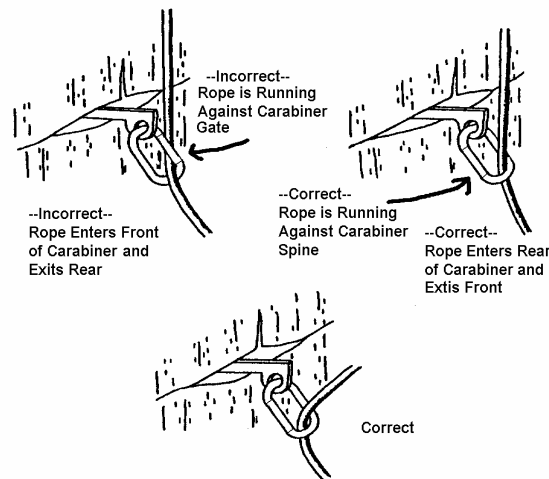
2. Protection should be placed whenever the leader feels he needs it, and BEFORE moving past a difficult section. A general rule of thumb is to place protection every body length. The climber must remember he will fall twice the distance from his last piece of protection before the rope can stop him.

3. Generally, protection is placed from one stable position to the next. The anchor should be placed above waist level. On traverses, the leader must consider the second's safety as well as his own. The potential fall of the second will result in a pendulum swing if there is not adequate

protection to prevent this. The danger comes from any objects in the swinging path of the second. The leader should place protection prior to, during, and upon completion of any traverse. This will minimize the potential swing, or pendulum, for both the leader and second if either should fall.

4. Once an anchor is placed, the climber "clips" the rope into the carabiner. As a carabiner hangs from the protection, there are two possible ways to route the rope through the carabiner. One way will allow the rope to run smoothly as the climber moves past the placement, the other way will often create a dangerous situation in which the rope could become "unclipped" from the carabiner if the leader were to fall on this piece of protection. This is known as back clipping. In addition, a series of incorrectly clipped carabiners may contribute to rope drag. When placing protection, the leader must ensure the carabiner on the protection does not hang with the carabiner gate facing the rock; when placing protection in a crack ensure the carabiner gate is not facing into the crack. To correctly make the clip:

- a. Grasp the rope with either hand with the thumb pointing down the rope towards the belayer
- b. Pull enough rope to reach the carabiner with a bight
- c. Note the direction the carabiner is hanging from the protection
- d. Place the bight into the carabiner so that, when released, the rope does not cause the carabiner to twist.



CLIPPING IN TO PROTECTION (SLING IS OMITTED FOR CLARITY)

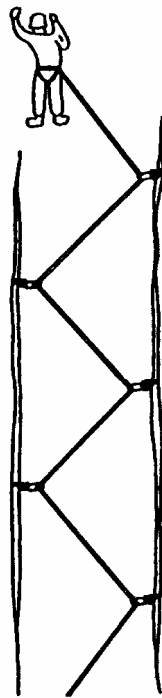
5. If the route changes direction, clipping the carabiner will require a little more thought. Once leaving that piece of protection, the carabiner might be forced to twist by the rope if not correctly clipped. If the clip is made correctly, all that may be necessary is a rotation of the clipped carabiner to ensure that the gate is not resting against the rock.

6. If the route is fairly vertical, keep the rope between your feet. If you are climbing diagonally or traversing, keep the rope above your feet, between you and the rock. To better visualize this possibility, picture yourself on the rock face and in these situations:

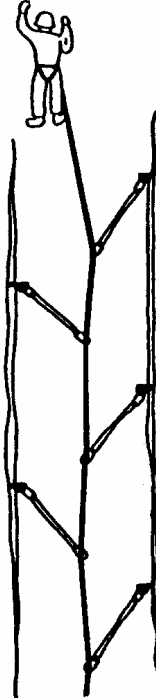
- a. The rope is tied to the front of the harness and is hanging down. If you are to the right of the last anchor, the rope should be extending from the tie in point to your left, in front, and above your feet.
- b. The rope is tied to the front of the harness and is hanging down. If you are to the left of the last anchor, the rope should be extending from the tie in point to your right, in front, and above your feet.
- c. The rope is tied to the front of the harness and is hanging down. You are climbing straight up from the last anchor; the rope should be extending from the tie in point straight down between your feet.

d. If the rope is not routed as above and you fall, there is a possibility of the rope catching your feet or legs and rotating you vertically as you fall, increasing your risk of a serious impact on the rock.

7. No matter how direct the route is, the climber will often encounter problems with "rope drag" through the protection positions. The friction created by rope drag will increase to some degree every time the rope passes through a carabiner. It will increase dramatically if the rope begins to "zigzag" as it travels through the carabiners. To prevent this, the placements should be positioned so the rope creates a smooth, almost straight line as it passes through the carabiners. Minimal rope drag is an inconvenience; severe rope drag may actually pull the climber off balance, inducing a fall. Rope drag can also be confused with the weight of the climber or belayer.

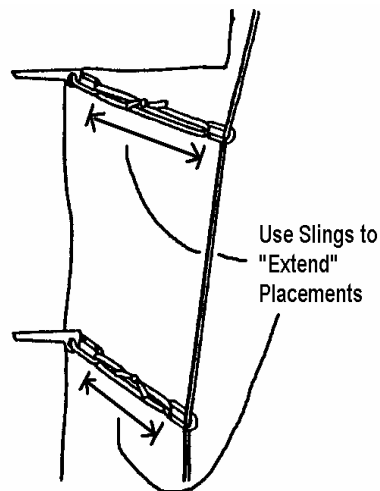


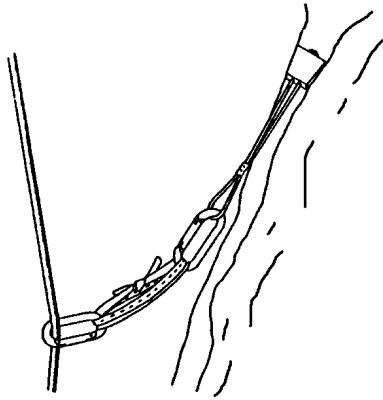
POOR
High Friction



BETTER
Minimal Friction

USE OF SLINGS ON PROTECTION





USE OF SLING ON A WIRED STOPPER

8. If it is not possible to place all the protection so the carabiners form a straight line as the rope moves through, you should “extend” the protection. Do this by attaching an appropriate length sling, or runner, to the protection to extend the rope connection in the necessary direction. The runner is attached to the protection’s carabiner while the rope is clipped into a carabiner at the other end of the runner. Extending placements with runners will allow the climber to vary the route slightly while the rope continues to run in a relatively straight line. Any placement extended with a sling will increase the distance of a potential fall by the actual length of the sling. Try to use the shortest slings possible, ensuring they are long enough to function properly.

9. Not only is rope drag a hindrance, it can cause undue movement of protection as the rope tightens between any “out of line” placements. Rope drag through chock placements can be very dangerous. As the climber moves above the placements, an outward or upward pull from rope drag may cause correctly placed chocks to pop out. Most chocks placed for leader protection should be extended with a runner, even if the line is very direct to eliminate the possibility of movement.

10. Wired chocks are especially prone to wiggling loose as the rope pulls on the stiff cable attachment. All wired chocks used for leader protection will have a runner attached. Some of the larger chocks, such as roped Hexentrics and Tri-Cams, have longer rope slings pre-attached that will normally serve as an adequate runner for the placement. Chocks with smaller sling attachments must often be extended with a runner.

11. Rope drag will quite often move SLCD’s out of position, or “walk” them deeper into the crack than initially placed, resulting in difficult removal or inability to remove them at all. Furthermore, most cases of SLCD movement, result in the SLCD moving to a position that does not provide protection in the correct direction or no protection at all due to the lobes being at different angles from those at the original position.

12. When a correctly placed piton is used for protection, it will normally not be affected by rope drag. A correctly placed piton is a multi-directional anchor, therefore, rope drag through pitons will usually only affect the leader’s movements but will continue to protect as expected.

13. The technique of placing a multidirectional anchor at the bottom of the climb (also known as a zipper stopper), will prevent a long fall. If the climber falls, the pull on the belayer and the rope will be up. Without a multidirectional protection as the first protection, the pull on this piece can be in the upward and outward direction, potentially causing the protection to pop out. The rope will then continue to apply upward and outward force to each successive piece of protection causing each piece to pop out. This zippering of protection can continue all the way to the climber. This would result in a long potentially fatal fall. The multidirectional anchor will prevent this zippering effect and ensure that all of the protection remains in place.

14. As the leader protects the climb, slack will sometimes be needed to place the rope through the carabiner (clipping). In this situation, the leader gives the command “SLACK” and the belayer gives slack, (if more slack is needed the command will be repeated). The leader is able to pull a bight of rope above the tie-in point and clip it into the carabiner in the protection above. When the leader has completed the connection, or the clip, the command “TAKE ROPE” is given by the leader and the

belayer takes in the remaining slack.

15. As the leader progresses, the belayer will be monitoring the amount of "stacked" rope. When the belayer estimates there is twenty-five feet of rope in the stack, he will give the notification "*TWEN-TY-FIVE*" loud enough for the leader to comprehend. The climber should begin to look for a belay position. The belayer will do the same at fifteen feet and at five feet. At the five feet signal, the climber should stop and set up a belay.

16. The leader continues on the route until either a designated belay location is reached or he is at the end of or near the end of the rope. At this position, the leader sets an anchor, connects to the anchor and signals "*OFF BELAY*". The belayer prepares to climb by removing all but at least one of his anchors and secures the remaining equipment. The belayer remains attached to at least one anchor until the command "*BELAY ON*" is given.

17. When the leader has established the new belay position and is ready to belay the follower, the "new" belayer signals "*BELAY ON*". The second, now the climber, removes any remaining anchor hardware/materials and completes any final preparations. The belayer maintains tension on the rope, unless otherwise directed, while the final preparations are taking place, since removal of these remaining anchors can introduce slack into the rope. When the second is ready, he can, as a courtesy, signal "*CLIMBING*", and the leader can, again as a courtesy, reply with "*CLIMB*". Slack must be kept out of the rope as in many situations the belayer cannot see the follower. A long pitch induces weight and sometimes drag on the rope and the belayer above will have difficulty distinguishing these from a rope with no slack.

18. Belaying the follower is very similar to belaying a top roped climb, in that the follower is not able to fall any further than rope stretch will allow.

19. When removing protection or cleaning the pitch, the second should rack it properly to facilitate the exchange and/or arrangement of equipment at the end of the pitch. When cleaning the pitch, SLCD's or chocks may be left attached to the rope to prevent loss if they are accidentally dropped during removal. If necessary, the hardware can remain on the rope until the second reaches a more secure stance. If removing a piton, the rope should be unclipped from the piton to avoid the possibility of damaging the rope with a hammer strike.

20. The second may need to place full body weight on the rope to facilitate use of both hands for protection removal; the command "*TENSION*" is used to tell the belayer to tighten the rope. The second must also ensure that he does not climb faster than the rope is being taken in by the belayer. If too much slack develops, he should signal "*TAKE ROPE*" or "*TENSION*" and wait until the excess is removed before continuing the climb. Once the second completes the pitch, he should immediately connect to the anchor. Once secured, he can signal "*OFF BELAY*". The leader removes the belay, while remaining attached to an anchor. The equipment is exchanged /organized in preparation for the next pitch or climb.

21. When the difficulty of the climbing is within the "margin of safety" of both climbers, valuable time can be saved by "swinging leads". This is normally the most efficient method for climbing multi-pitch routes. The second finishes cleaning the first pitch and continues climbing, taking on the role of lead climber. Unless he requires equipment from the other rack or desires a break, he can climb past the belay and immediately begin leading. The belayer simply adjusts his position, re-aiming the *BELAY ON* once the new leader begins placing protection. Swinging leads, or "leap frogging" as it is also called, should be planned prior to starting the climb so the leader knows to anchor the upper belay for both upward and downward pulls during the setup.

22. For three man teams the second and third climbers should tie into a second rope. The second will drag this rope up the climb as he is belayed by the first climber. The second will complete the climb and set up a belay to bring up the third climber.

SECTION IV**SUMMARY**

**Review/
Summarize
Lesson**

ACTION	Prepare for and perform a two person lead climb
CONDITION	Given a adequate mountaineering equipment and a 5 th class rock climb (YDS)
STANDARD	Prepare for and perform a two person lead climb IAW the NWTC Mountain Operations Manual.

**Check on
Learning**

a. Why should the leader carry a nut tool?

To remove incorrectly placed/stuck protection or to clean dirt/vegetation from cracks.

b. What is the primary purpose of the 20ft. x 7mm rope?

Cordelette uses as in equalizing anchors.

c. If the leader stretches and reaches as high as absolutely possible to place protection, what could happen?

Position may fail while reaching to place the piece, or while attempting to clip the rope into the protection, the climber falls with all the rope pulled out to make the "long" clip, resulting in a longer fall.

**Transition to
Next Lesson**

As per NWTC training schedule; dependent upon course in conduct.

SECTION V**STUDENT EVALUATION**

**Testing
Requirements**

Students will be tested on this task during the Mountain Stakes portion of training as per the NWTC training schedule for this course.

**Feedback
Requirement**

Students will receive two opportunities to pass each event tested. Re-training will be conducted for students that fail the first iteration of testing. Refer to M021/22 for specifics.

Lesson 4 VIII.0703, Roped Climbing- Aid Climbing

ADMINISTRATIVE DATA

**All courses
Including this
lesson**

Course Number	Course Title
NA	Mountain Instructor Qualification Course
NA	Basic Mountaineering Course
NA	Assault Climber Course

**Task(s)
Taught or
Supported**

Task Number	Task Title
VIII.0703.01	Prepare to aid climb
VIII.0703.02	Perform an aid climb
VIII.0703.03	Prepare to second an aid climb
VIII.0703.04	Second an aid climb

**Tasks(s)
Reinforced**

Task Number	Task Title
VI.0200	Risk Management for Mountain Operations
VIII.0200	Mountaineering Equipment
VIII.0300	Rope Management and Knots
VIII.0400	Anchors
VIII.0500	Climbing
VIII.0600	Belays
VIII.0702	Lead Climbing

**Test
Lesson
Number**

Hours	Lesson Number	Lesson Title
	M021/M022	ACC Mountaineering Review, MIQC Review

**Prerequisite
Lessons**

M005, M006, M007, M008, M009, M010, M011

References

Number	Title	Date	Additional Information
	NWTC Mountain Operations Manual	FY04	Updated yearly
FM 3-97.6	Mountain Operations	November 2000	http://www.adtdl.army.mil/
FM 3-97.61	Military Mountaineering	August 2002	http://www.adtdl.army.mil/

**Student
Assignments**

Read TSP M012

**Instructor
Requirements**

MIQC graduate, TAITC graduate

**Additional
Personnel
Requirements**

Two assistants to demonstrate aid climbing.

**Equipment
Required
for
Instruction**

Instructor and student Materials:

- NWTC Mountaineering Operations Manual
- Risk Management for Mountain Operations
- 16- small wired stoppers on a carabiner
- 12- medium to large wired stoppers on a carabiner
- 2- Set of hexentrics, each on a separate carabiner
- 16- standard length runners, with two carabiners on each
- 4- double length runners, with two carabiners on each
- 3-extra carabiners
- 1- nut tool
- 1- 6ft x 7mm rope
- 1- 12ft x 7mm rope
- 1- 20ft x 7mm rope
- 1- 10 feet x 1in tubular webbing
- 1- 20 feet x 1in tubular webbing
- 1- belay / rappel device
- 1- Large locking carabiner
- 2- carabiners
- 1- nut tool
- 1- 50 meter dynamic rope
- 1- Helmet
- 2- aiders (or webbing to improvise a set with)
- 3- daisy chains (or webbing to improvise a set with)
- 2- additional carabiners to connect aiders and daisy chains
- 1- fifi hook (or an additional carabiner for that use)
- 2- sets of SLCD's (optional)
- Pen and notepad

**Materials
Required**

Instructor Materials:

- NWTC Mountain Operations Manual
- Risk Management for Mountain Operations

Student Materials:

- NWTC Mountain Operations Manual
- Risk Management Guide for Mountain Operations

**Classroom
Training
Area and
Range
Requirements**

Rock climbing area with 5th class routes and safe access to the top of the climb(s).
Climb(s) should be at least thirty feet tall.
Area large enough to facilitate eight students, one instructor, and two assistant instructors.
Rock must not be simulated.

**Ammunition
Requirements**

None

**Instructional
Guidance**

You must know the information contained in this TSP well enough to teach from it, not read from it.

**Branch
Safety
Manager
Approval**

NAME	Rank	Position	Date
Mark Gilbertson	GS-09	Training Specialist	

**Proponent
Lesson Plan
Approvals**

NAME	Rank	Position	Date
Peter Smith	GS-12	Training Administrator	

M012d: ROPED CLIMBING: AID CLIMBING

SECTION II**INTRODUCTION**

Method of instruction: Small Group

Type of instruction: Demonstration and Practical Exercise

Instructor to student ratio: 1:3

Time of instruction: 6 Hours

Media used: None

Motivator

If a route is too difficult to free climb and is unavoidable, and if the correct equipment is available aid climbing the route is an option. Aid climbing consists of placing protection and putting full body weight on the piece. In aid climbing, you don't climb the rock, you climb the anchors you place on the route. This gives you the ability to ascend more difficult routes than you can free climb.

There are two types of aid climbing, aid and clean aid. The difference is in the type of anchors placed on the route. Aid climbing uses anything from pitons that usually scar the rock to bolts drilled consecutively about each two feet for the length of the climb.

Clean aid consists of using chocks and/or SLCD's, and is the simplest form of aid climbing. Placing the protection is no different than lead climbing, except you are placing many more pieces.

Terminal Learning Objective

ACTION	Prepare for and perform an aid climb
CONDITION	Given a adequate mountaineering equipment and a 5 th class rock climb (YDS)
STANDARD	Prepare for and perform an aid climb IAW the NWTC Mountain Operations Manual.

Safety Requirements

Ensure that students:

- Receive a risk assessment prior to movement to the training area and before practical exercises.
 - Have all necessary equipment for the PE's, to include any additional equipment required by the NWTC SOP.
 - Have two full canteens and drink adequate water to avoid becoming dehydrated.
 - Receive a briefing on the symptoms of heat injury or cold weather injury, as appropriate.
-

Risk Assessment Level

Determined by the instructor

Environmental Considerations

None

Instructional Lead-in

You have learned mountaineering equipment, rope management and knots, anchors, belay techniques, climbing, top roped and lead climbing. Now we will look at using aid to overcome the difficulties of a vertical route.

SECTION III**PRESENTATION****ELO A**

ACTION	Prepare to aid climb
CONDITION	Given a adequate mountaineering equipment and a 5 th class rock climb (YDS)
STANDARD	Prepare to aid climb IAW the NWTC Mountain Operations Manual.

Learning Step/ Activity 1- Equipment

Aid climbing can be accomplished with various types of protection. Regardless of the type of protection used, more will be necessary due to the process itself- placing anchors about each two feet. In addition to the equipment racked / prepared for free climbing, other specialized equipment will be needed:

a. Pitons are used the same as for free climbing. Most piton placements will require the use of both hands. Piton usage will usually leave a slight or drastic scar in the rock just by virtue of the hardness of the piton and the force required to set it with a hammer. Swinging a hammer to place pitons will lead to climber fatigue sooner than clean aid. Since pitons are multidirectional, the strength of a well placed piton is more secure than most clean aid protection. Consider other forms of protection when noise could be hazardous to tactics.

b. Bolts are used when no other protection will work; bolts are a more permanent form of protection and more time is needed to place bolts; placing bolts creates more noise whether drilled by hand or with a motorized drill. Bolts used in climbing are a multi-part expanding system pounded into pre-drilled holes and then tightened to the desired torque with a wrench or other tool. Bolts are used in many ways in climbing today, the most common use is with a “hanger” attached and placed for anchors in face climbing, however, bolts can be used for aid climbing, with or without the hanger.

1. Placing bolts for aid climbing will take much more time than using pitons or clean aid. Bolting for aid climbing will consist of consecutive bolts about two feet apart. The time required to drill a sufficient hole is approximately thirty minutes with a hand drill and up to two minutes with a powered hammer drill. As you can see, a lot of time and work is expended in a short distance no matter how you drill the holes, (the weight of a powered hammer drill will become an issue in itself).

2. The typical climbing bolt/hanger combination costs on average \$7.00 each, normally each one is left in the hole it was placed in. Other items that can be used instead of the bolt/hanger combination are the removable and reusable “spring loaded removable bolts”; rivets- hex head threaded bolts sized to fit tightly into the hole and pounded in with a hammer; split shaft rivets; some piton sizes can be pounded into the holes. These bolts and rivets can be purchased at many hardware stores. If using rivets or bolts as rivets, if not using a hanger place a loop of cable over the head and onto the shaft of the rivet or bolt and attach a carabiner to the other end of the loop; a stopper with the chock slid back will suffice. There are rivet hangers being produced today that can be slid onto the rivet or bolt after it is placed and this hanger can be removed easily for re-use. Easy removal means a slight loss of security while in use.

c. SLCD's are used the same as for free climbing, although in aid climbing, full body weight is applied to the SLCD as soon as it is placed.

d. Chocks are used the same as for free climbing, although in aid climbing, full body weight is applied to the chock as soon as it is placed.

e. Daisy chains are a tied or pre-sewn loop of webbing with small tied or pre-sewn loops approximately every two inches; the small loops are just large enough for two or three carabiners; two daisy chains should girth hitched to the tie-in point in the harness.

f. Aiders or etriers are tied or pre-sewn webbing loops with 4 to 6 tied or pre-sewn internal loops, or steps, approximately every 12 inches. The internal loops are large enough to easily place one booted

foot into; at least two aiders should be used. The aiders will be connected by carabiner to the free ends of the daisy chains. A 6 inch piece of 1 inch tubular nylon is tied into the attachment point of each aider. These are known as grab loops and their use is described later.

g. Ascenders are mechanical devices which will move easily in one direction on the rope but will lock in place if pushed or pulled the other direction. A Prussik can be used but are difficult as compared to ascenders.

h. A Fifi hook should be girth hitched to the tie in point in the harness. The hook is placed in the small loops of the daisy chain to adjust the effective length of the daisy chain. A carabiner can be used in place of the fifi hook. Although the fifi hook is simpler to use, a carabiner will not “fall out” of the daisy chain in some situations as the fifi hook will.

i. The leader generally sets up as follows:

1. A seat harness is worn.
2. Two daisy chains are girth hitched to the tie in point of the harness.
3. A Fifi hook is girth hitched to the seat harness at the tie in point.
4. Two or four aiders may be used. For this description use of four will be described. Two aiders are attached to the last loop of each daisy chain with a carabiner. Clip one set of aiders to one side of the harness and the other set of aiders to the opposite side of the harness.
5. Gear is racked for the route.
6. The climber ties into the climbing rope and prepares to lead the route as for lead climbing. For advanced aid climbing, a second haul line (static rope), may be trailed behind the leader. A third trail line (thin dynamic rope), may also be trailed behind the leader. The use of these lines will not be described in this text.

j. The second generally sets up as follows:

1. The seat harness is worn.
2. Two daisy chains are girth hitched to the tie in point of the harness.
3. The Fifi hook is girth hitched to the seat harness. Clip a locking carabiner to the tie in point of the harness.
4. Clip two aiders to the harness. These will be used if the second later leads a pitch.
5. Two additional aiders are attached to each daisy chain with a locking carabiner. An ascender is attached to each locking carabiner. The attachment point on the daisy chain is critical. The attachment point should allow the climber to attach the each ascender to the rope within an arms length of the climber. This attachment point will need to be determined prior to attempting a long climb. The importance of this will be described later. Each of these setups can be clipped to the harness until the second is ready to climb.
6. The second ties into the climbing rope.
7. The second established a belay for lead climbing.

ELO B

ACTION	Perform an aid climb
CONDITION	Given a adequate mountaineering equipment and a 5 th class rock climb (YDS)
STANDARD	Perform an aid climb IAW the NWTC Mountain Operations Manual.

Learning Step/ Activity 1- Technique

a. The belay will be the same as in normal lead climbing and the rope will be routed through the protection the same way as well. The big difference is the movement up the rock. The second will be climbing the anchors, or protection. With the rope, daisy chains, aiders, and fifi hook attached to the rope tie-in point of the harness as stated above, and secured temporarily to a gear loop or gear sling, the climb continues as follows:

1. The leader places the first piece of protection as high as can safely be reached and attaches the appropriate sling/carabiner.

2. Attach one daisy chain/aider group to the newly placed protection. The aider group should be attached to the carabiner attached to the piece of protection, not the carabiner that will be used for the rope connection.
3. Ensure the protection is sound by weighting it gradually; place both feet, one at a time, into the steps in the aider, secure your balance by grasping the grab loop on the aider with your hands.
4. Bounce testing is used to ensure that the protection will not fail. This technique is generally used for more serious aid climbing. It involves gradually applying increased pressure to the protection by weighting the protection with the legs and eventually using body weight to bounce until you are confident that the protection will not fail. At times a placement will only be good enough for the leader for body weight; it may not hold a leader fall. The placement only allows the leader to place another piece of protection up higher and continue upward progress. Established aid climbs get their ratings based on the number of opportunities a climb allows climbers to place solid protection; the farther apart these opportunities for solid protection are, the more difficult the rating of the aid climb. For military purposes, aiding is generally used when the difficulty of the climb exceeds
5. Begin climbing the aiders. Normally you should not climb to the upper most rung of the aiders. A good rule of thumb is to get the waist no higher than the piece of protection. At this point the Fifi hook can be clipped into the carabiner attached to the protection. This will allow the climber to rest on the protection without using the arms. Moving the waist higher than the top of the aider is possible, but this creates a potential for a fall to occur even though you are on the aider and "hooked" close to the protection with the daisy chain. As the daisy chain tie-in point on the harness moves above the top of the aider, you are no longer supported from above by the daisy chain; you are now standing above your support. From this height, the fifi hook can fall out of the daisy chain loop if it is unweighted. If this happens, you could fall the full length of the daisy chain.
6. If the climber is confident the protection will hold a leader fall, this is the time to clip the rope into the protection, (the same as for normal lead climbing).
7. The leader now places the next piece of protection, adds a sling and clips the other aider group to it.
8. The leader now moves into this new aider group and repeats the process of bounce testing, climbing the aiders to waist level and attaching the rope to the connection. This process is repeated until the climb is repeated.
9. Tasks at the completion of the pitch are the same as lead climbing- anchor, "OFF BELAY," prepare for the second. To prepare for the second the leader will need to remove any slack between him and the second and fix the rope to a solid anchor system. The second will be climbing this rope with the ascender aider set-up.

ELO C

ACTION	Second an aid climb
CONDITION	Given a adequate mountaineering equipment and a 5 th class rock climb (YDS)
STANDARD	Second an aid climb IAW the NWTC Mountain Operations Manual.

Learning Step/ Activity 1- Seconding

- a. When the pitch is completed, the belayer will need to ascend the route. To ascend the route:

1. Attach both of the ascenders to the rope. Attach the dominant hand side above the non-dominant hand side.

2. Place the left foot into the aider with the left handed ascender and the right foot into the aider with the right handed ascender. Again the attachment point here is critical. It is difficult to give a good description of the best way to get this adjustment right. If it is too short movement will be short ineffective movements. If it is too long the arms will support the weight and the climber will quickly tire. When adjusted to the correct height, the arms need not support the body's weight. If the ascender is too high, you will have difficulty reaching and maintaining a grip on the handle.

3. The top ascender is moved up the rope as high as possible. The climber can then rest by laying back on the daisy chain, and repeat the process with the lower ascender. This process should be smooth; most of the climbing is accomplished with the legs not with the arms.

4. Unlike lead climbing, there will be a continuous load on the rope during the cleaning of the route;

this would normally increase the difficulty of removing protection. To make this easier, as you approach the protection on the ascenders, move the ascenders, one at a time, above the piece. When your weight is on the rope above the piece, you can easily unclip and remove the protection.

5. The climber should tie in short with a figure eight loop every 10 – 20 feet to avoid a serious fall in the event of both ascenders failing. These loops are clipped into a separate locking carabiner on the tie in point of the harness. At every tie in point the new knot is clipped in before the old knot is removed and cleared.

6. The process is repeated until the belay is reached.

ELO D

ACTION	Describe clean aid climbing
CONDITION	Given a adequate mountaineering equipment and a 5 th class rock climb (YDS)
STANDARD	Describe clean aid climbing IAW the NWTC Mountain Operations Manual.

Learning Step/ Activity 1- Clean Aid Climbing

a. Clean aid climbing consists of using protection placed without a hammer or drill involvement: chocks, SLCD's, hooks, and other protection placed easily by hand. This type of aid climbing will normally leave no trace of the climb when completed. Just as in all other anchor situations, clean aid climbing requires bomb-proof anchors since the climber(s) will be placing full body weight on each piece.

b. Hooks are any device that rests on the rock surface or cams into a crack with force applied. These are normally held in place only by gravity or the climbers' weight. Hooks are just what the name implies, a curved piece of hard steel with a hole in one end for webbing attachment. The hook blade shape will vary from one model to another, some have curved or notched "blades" to better fit a certain crystal shape on a face placement. This type of protection due to their passive application is actually only secure while weighted by the climber. Although the rope will be connected to hooks just as other protection, they can be moved and "dislodged" easily by rope movement, even by wind. Some sections of rock can be protected with hook use that could not be protected with other means. Although bolts could be used, hook usage is faster and quieter but the margin of safety is not there unless hooks are alternated with more active forms of protection. If a twenty foot section of a route is protected with hooks, a forty foot fall could result due to the very passive nature of hooks.

SECTION IV

SUMMARY: Aid techniques can become very complex; it is beyond the scope of this text to describe all aid techniques in use today. The techniques described are one simple method of aid climbing.

Check on Learning

a. How many hexes, stoppers, etc. should be carried for an aid climb?

As many as necessary. More anchors will be placed in aid climbing than in normal lead climbing, so more protection is needed.

b. Why should you use the carabiner or fifi hook to shorten the daisy chain length while aid climbing?

This enables the climber to rest closer to the top of the aider while placing the next anchor

c. If an aid climber moves above the top of the aider and the fifi hook disconnects from the daisy chain, what could happen?

If the climber loses his grip in the aider handle and falls, he will fall the full length of the daisy chain and because all this material is of a "static" construction, there will be an abrupt shock load to the climber and the anchor he is hanging from.

Review and Summarize Lesson

ACTION	Prepare for and perform an aid climb
CONDITION	Given adequate mountaineering equipment and a 5 th class rock climb (YDS)
STANDARD	Prepare for and perform an aid climb IAW the NWTC Mountain Operations Manual.

Transition to next lesson

As per NWTC training schedule; dependant upon course in conduct.

SECTION V**STUDENT EVALUATION**

**Testing
Requirements**

Students will be tested on this task during the Mountain Stakes portion of training as per the NWTC training schedule for this course.

**Feedback
Requirement**

Students will receive two opportunities to pass each event tested. Re-training will be conducted for students that fail the first iteration of testing. Refer to M021/22 for specifics.
